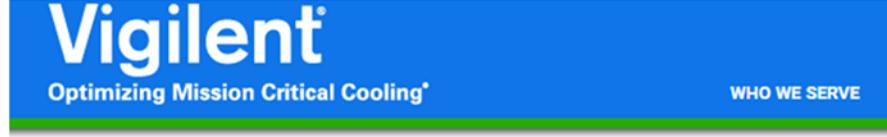


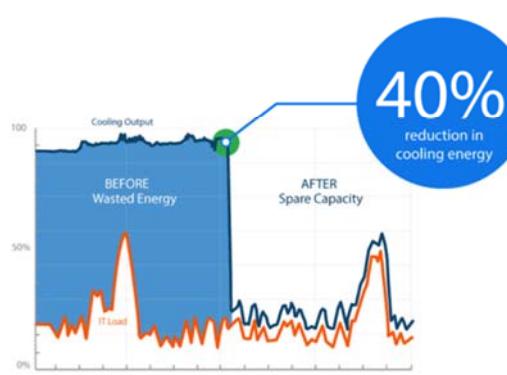
Exhibit 8

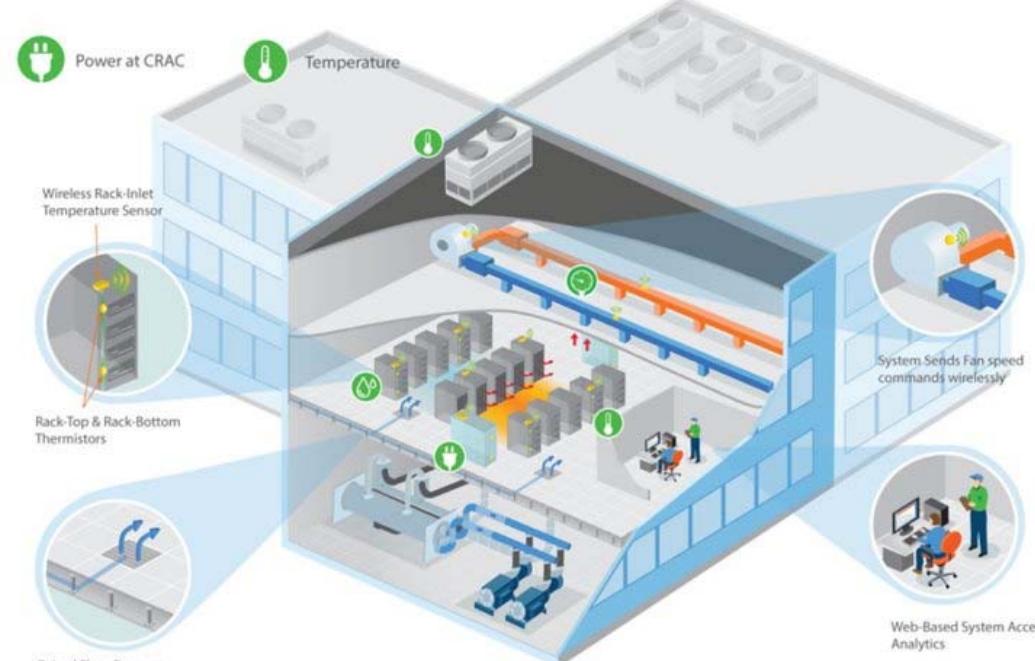
U.S. Patent No. 6,854,287 – Infringement Claim Chart

Claim 1	Exemplary Evidence of Infringement by Digital Realty
<p>[1pre] A method for cooling a room configured to house a plurality of computer systems, said method comprising:</p>	<p>Digital Realty's data centers use a method for cooling a room configured to house a plurality of computer systems.</p> <p>For example, Digital Realty uses Vertiv (Liebert) cooling units in each colocation data center. Liebert cooling units are controlled by Liebert's iCOM Intelligent Communication and Monitoring system.</p>  <p>https://www.youtube.com/watch?v=OmV1SFy5cEg at 1:43.</p> <p>Digital Realty also, or alternatively, uses Vigilant's dynamic cooling management which provides cooling to the server racks of a data center.</p>

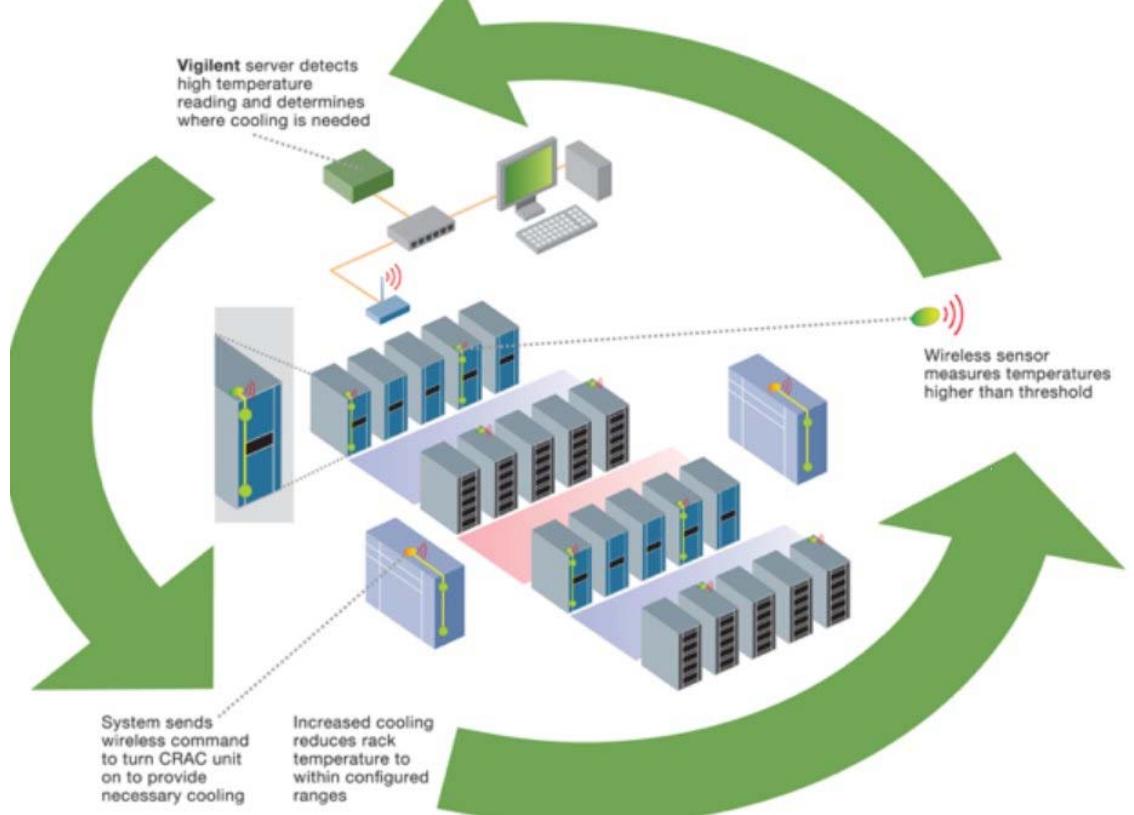
Claim 1	Exemplary Evidence of Infringement by Digital Realty
	 <p>DIGITAL REALTY</p> <p>“We found that upgrading fans and adding fan speed controls in our data centers allowed us to cool them more effectively and efficiently. In addition, the facility’s electrical energy usage was reduced, as was the average and peak electric power demand, resulting in a more energy efficient and sustainable data center environment.”</p> <p>— Jim Smith, Chief Technology Officer, Digital Realty</p> <p>https://www.vigilent.com/digital-realty/</p>

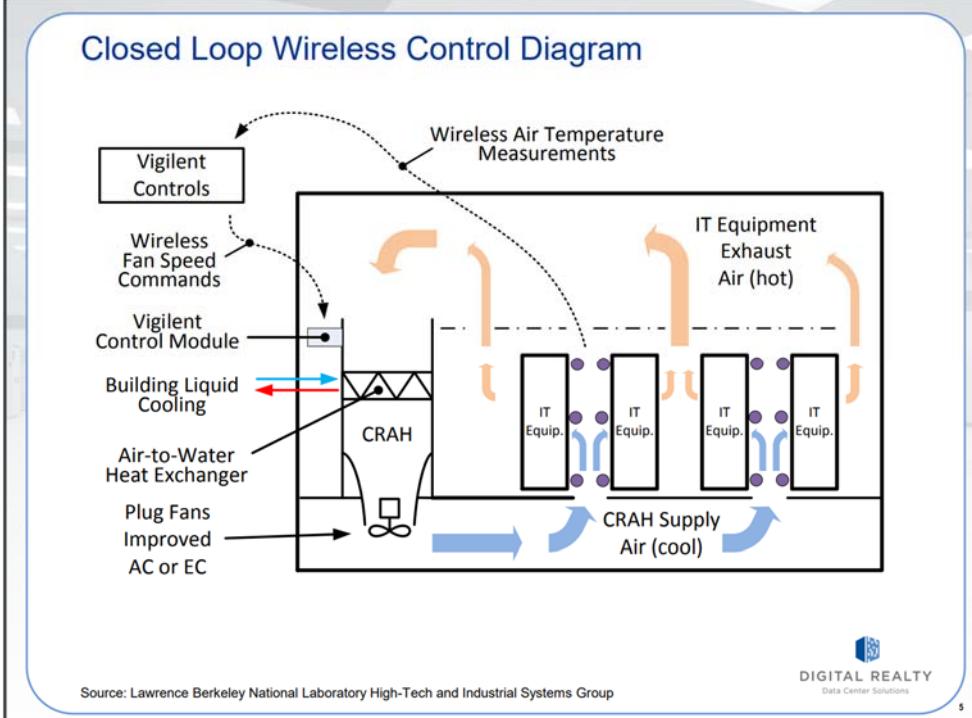
Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>DIGITAL REALTY DECREASES DATA CENTER COOLING ENERGY USAGE BY 66%</p> <p>Energy Management Software and Variable Speed Fans Dramatically Reduce Carbon Emissions, PUE</p> <p>San Francisco, CA – December 12, 2012 – Digital Realty Trust, Inc. (NYSE: DLR), Vigilent® Corporation, and Lawrence Berkeley National Laboratory today announced the results of a joint study focused on improving the energy efficiency of a data center designed, owned and operated by Digital Realty.</p> <p>https://www.vigilent.com/digital-realty-decreases-data-center-cooling-energy-usage-by-66/</p> <p>Vigilent instruments the white floor with sensors that continuously monitor temperatures at the server rack. Data from hundreds or thousands of temperature sensors is constantly and wirelessly transmitted to local gateways that aggregate the data before sending it to the AI Engine, which controls the cooling infrastructure.</p> <p>The Vigilent system makes control decisions designed to eliminate hot spots while avoiding unnecessary overcooling; at the same time, cooling units are automatically managed under dynamic control to ensure that the most optimal choices of CRACs or CRAHs are made, reducing your energy spend.</p> <p>https://www.vigilent.com/who-we-serve/by-role/data-center-designer/.</p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>VIGILENT CONTINUOUSLY MATCHES COOLING OUTPUT TO HEAT LOAD</p> <p>Optimized airflow eliminates hot spots.</p> <p>Vigilent continuously optimizes the airflow in your facility, delivering improved reliability and availability. The system automatically finds and eliminates hot spots, while its comprehensive reports and tools facilitate easier operations management.</p> <p>Our system delivers the right amount of cooling exactly where it's needed. This typically results in up to a 40% reduction in carbon emissions and your cooling energy bill. We achieve that with sophisticated AI-based technology that learns your environment and adapts to change.</p> <p>https://www.vigilent.com/who-we-serve/by-facility/data-centers/</p> 

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	 <p>The diagram illustrates a data center with various monitoring and control systems. Key components include:</p> <ul style="list-style-type: none">Power at CRAC: A green plug icon.Temperature: A green thermometer icon.Wireless Rack-Inlet Temperature Sensor: A circular inset showing a sensor attached to a server rack.Rack-Top & Rack-Bottom Thermistors: A circular inset showing sensors on the top and bottom of a server rack.Raised Floor Pressure: A circular inset showing a pressure measurement device on the floor. <p>The data center interior shows server racks, cooling ducts, and a control room where two people are monitoring a computer screen. The system is described as "Constantly adapting" and "AI engine constantly changes cooling when it detects new equipment and varying IT loads".</p> <p>Constantly adapting The AI engine constantly changes cooling when it detects new equipment and varying IT loads.</p> <p>https://www.vigilant.com/who-we-serve/by-facility/data-centers/</p>

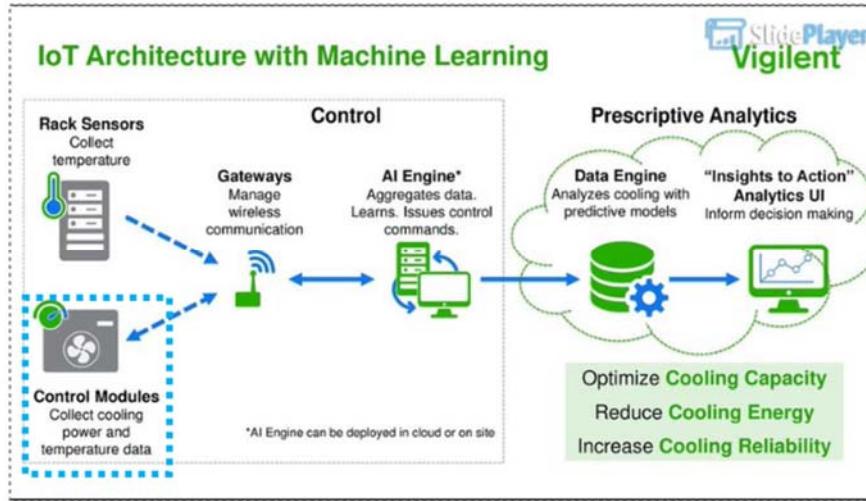
Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>Granular control & visibility</p> <p>The Vigilent system provides you with rack-level visibility, and automatically controls cooling resources to ensure you're getting the right amount of cooling to the locations you care about most.</p> <p>https://www.vigilent.com/who-we-serve/by-role/data-center-operator/</p> <p>Vigilent also detects high temperature readings and sends command to the cooling units to control the temperature.</p> <p style="text-align: center;">DYNAMIC CONTROL</p> <p style="text-align: center;">Automatic, real-time thermal management.</p> <p>The Vigilent Control System combines the temperature data gathered by the monitoring system with powerful machine learning. It automatically determines how to best adjust your facility's cooling resources – constantly and in real time – to match the current heat load, all while using the minimum amount of energy possible.</p> <p>https://www.vigilent.com/products-and-services/vigilent-dynamic-cooling-management-system/</p>

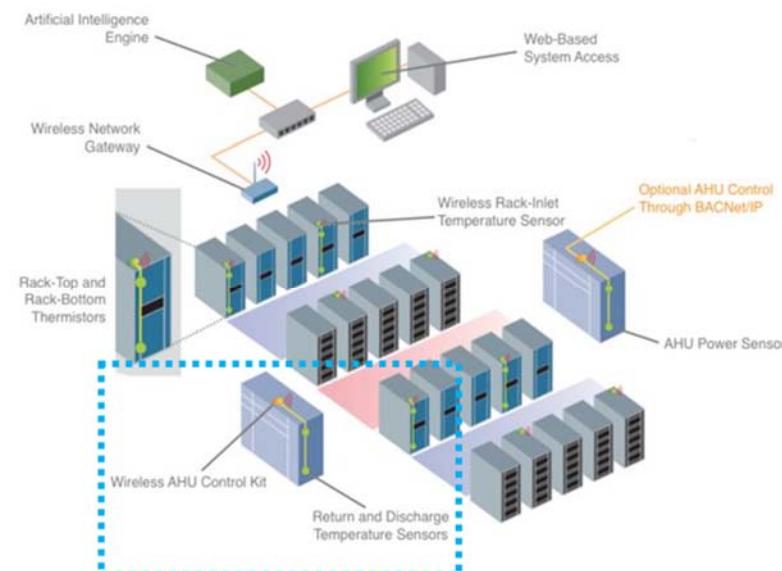
Claim 1	Exemplary Evidence of Infringement by Digital Realty
	 <p>The diagram illustrates a data center cooling system. A green curved arrow indicates the flow of the process. A Vigilent server at the top left monitors multiple server racks. A wireless sensor on one of the racks detects a high temperature reading. The Vigilent server then sends a wireless command to a CRAC unit (represented by a blue cube) to turn it on, which in turn provides cooling to the rack. The racks are shown with various colors (blue, grey, purple) and are arranged in a grid. A legend on the right shows a green circle with a signal icon and the text 'Wireless sensor measures temperatures higher than threshold'. Another legend at the bottom shows a blue cube with a signal icon and the text 'System sends wireless command to turn CRAC unit on to provide necessary cooling'. A third legend shows a red circle with a signal icon and the text 'Increased cooling reduces rack temperature to within configured ranges'.</p> <p>https://techcrunch.com/2012/03/26/vigilent-raises-6-7m-from-accel-for-intelligent-data-center-energy-management-system/?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xIbmNvbS8&guce_referrer_sig=AQAAAHN5ro4OJaRHQi5FRCMvqn2bp-tTxvWCI3YIbeLD</p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>The Cooling Capacity Report builds on Intelligent Analytics™ technology to display the amount of available cooling at each site, room, and individual cooling unit, on demand. This information enables facility managers to more quickly identify where equipment or racks can be shifted to improve cooling capacity and to distinguish between hot spots caused by airflow issues and those that indicate a facility is running at maximum capacity. As a result, additional IT load can frequently be added without the need for more cooling resources.</p> <p>https://www.vigilant.com/vigilant-brings-active-cooling-capacity-planning-to-dcim/.</p>  <p>Closed Loop Wireless Control Diagram</p> <p>This diagram illustrates a closed-loop control system for a data center cooling system. It shows the flow of air and data between IT equipment, a CRAH unit, and a Vigilant Control Module.</p> <p>Components and Flow:</p> <ul style="list-style-type: none"> IT Equipment: Four units are shown, each with a blue arrow pointing to a "CRAH Supply Air (cool)" duct. CRAH Unit: A central unit that receives "CRAH Supply Air (cool)" and releases "IT Equipment Exhaust Air (hot)". Vigilant Control Module: Located between the CRAH and the IT equipment. Vigilant Controls: A box at the top left that sends "Wireless Fan Speed Commands" to the control module. Building Liquid Cooling: A red arrow pointing to a heat exchanger. Air-to-Water Heat Exchanger: A component connected to the liquid cooling system. Plug Fans Improved AC or EC: Small fans located near the bottom of the CRAH unit. Wireless Air Temperature Measurements: Sensors that send data back to the Vigilant Controls box. <p>Source: Lawrence Berkeley National Laboratory High-Tech and Industrial Systems Group</p> <p>DIGITAL REALTY Data Center Solutions</p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>https://www.vigilent.com/wp-content/uploads/2014/06/DigitalRealty.pdf</p>
<p>[1a] providing a plurality of heat exchanger units configured to receive air from said room and to deliver air to said room;</p>	<p>Digital Realty provides a plurality of heat exchanger units configured to receive air from said room and to deliver air to said room.</p> <p>For example, Digital Realty uses Liebert cooling units which are heat exchangers that receive air from the room and deliver cool conditioned air to the room by transferring heat from the air to a fluid.</p>  <p>https://www.youtube.com/watch?v=OmV1SFy5cEg at 1:43.</p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>Vigilent's dynamic cooling management activates the cooling units, that deliver and receive air from the room, and measures the return and discharge air temperatures.</p> <p>MONITOR STATUS</p> <p>CRAC, CRAH, and AHU temperature sensors constantly measure the discharge and return air temperatures of your cooling equipment. This data is stored indefinitely to enable the detection of long-term trends.</p> <p>https://www.vigilent.com/products-and-services/monitoring/</p> <p>You can track different cooling unit variables, including:</p> <ul style="list-style-type: none"> ● BOP is the control output, which is how the Vigilent system can adjust cooling units by turning them on or off ● Discharge Air is the temperature of air being supplied to the facility by the cooling unit ● Power Monitor will display the amount of power in kilowatts (kW) being used by that equipment ● Return Air is the temperature of the air coming back into the cooling unit ● Return and Discharge Temperature Sensors – Measures the return air and discharge air temperature for each cooling unit <p>https://fccid.io/ANATEL/01612-15-08292/MANUAL/16006226-67DD-49FB-8873-2E15C3330211/PDF, pp. 2, 24.</p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>IoT Architecture with Machine Learning</p>  <p>The diagram illustrates an IoT architecture for data center cooling management. It starts with Rack Sensors (Collect temperature) and Control Modules (Collect cooling power and temperature data), which send data to a Gateways (Manage wireless communication). The Gateways then connect to an AI Engine* (Aggregates data. Learns. Issues control commands). The AI Engine can be deployed in the cloud or on site. The AI Engine sends commands back to the Control Modules and data to a Data Engine (Analyzes cooling with predictive models). The Data Engine provides "Insights to Action" through an "Analytics UI" (Inform decision making). The system aims to Optimize Cooling Capacity, Reduce Cooling Energy, and Increase Cooling Reliability.</p> <p>https://slideplayer.com/slide/12118919/</p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	 <p>https://slideplayer.com/slide/12118919/.</p>
[1b] supplying said plurality of heat exchanger units with cooling fluid from an air conditioning unit;	<p>Digital Realty supplies said plurality of heat exchanger units with cooling fluid from an air conditioning unit.</p> <p>For example, Digital Realty uses Liebert's cooling units which have an evaporator. Refrigerant cooling fluid flows through heat exchanger coils in evaporator.</p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty						
	<p>1. Full Compressor Mode</p> <table border="1"> <thead> <tr> <th>COOLING MODE</th> <th>OUTDOOR TEMP</th> <th>COOLING PUE</th> </tr> </thead> <tbody> <tr> <td>Full Compressor</td> <td>95</td> <td>1.28</td> </tr> </tbody> </table> <p>https://www.vertiv.com/49f1fd/globalassets/products/thermal-management/room-cooling/liebert-dse-sales-brochure-sl-18927_00.pdf</p> <p>Digital Realty uses Liebert cooling units which have a chilled water control valve. Chilled water cooling fluid flows through heat exchanger coils in evaporator.</p>	COOLING MODE	OUTDOOR TEMP	COOLING PUE	Full Compressor	95	1.28
COOLING MODE	OUTDOOR TEMP	COOLING PUE					
Full Compressor	95	1.28					

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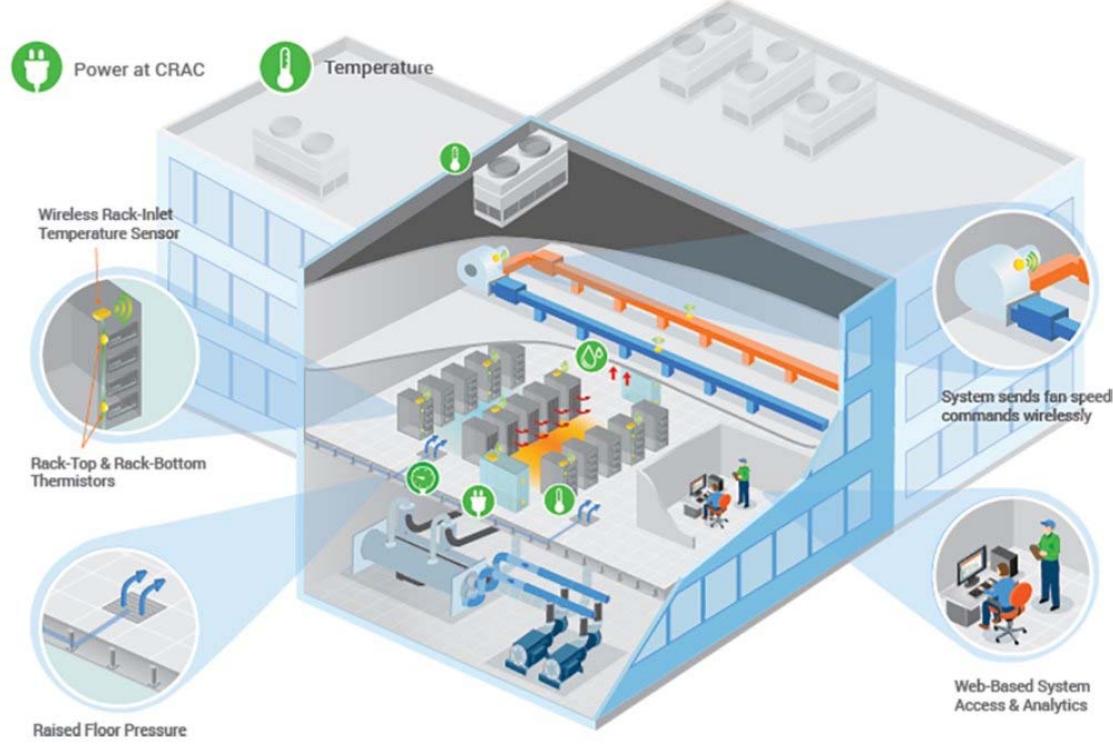
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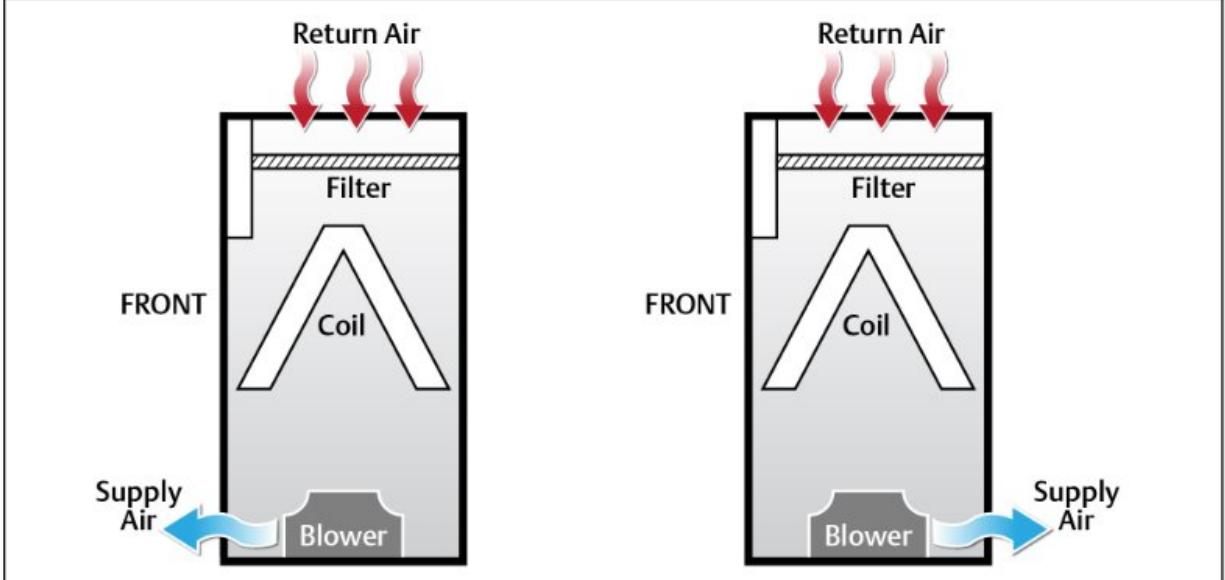
Chilled Water Control Valve

The chilled water valve provides proportional control action in response to room temperature and humidity as sensed by the microprocessor control. It includes operating linkage and electronic motor. Unlike other systems of this nature it requires no over-travel linkage or end switches to be adjusted. The control uses "intelligent logic" to eliminate valve hunting, thus greatly increasing the life of the valve. The valve can be a 3-way or 2-way to meet the appropriate requirements of the installed system.

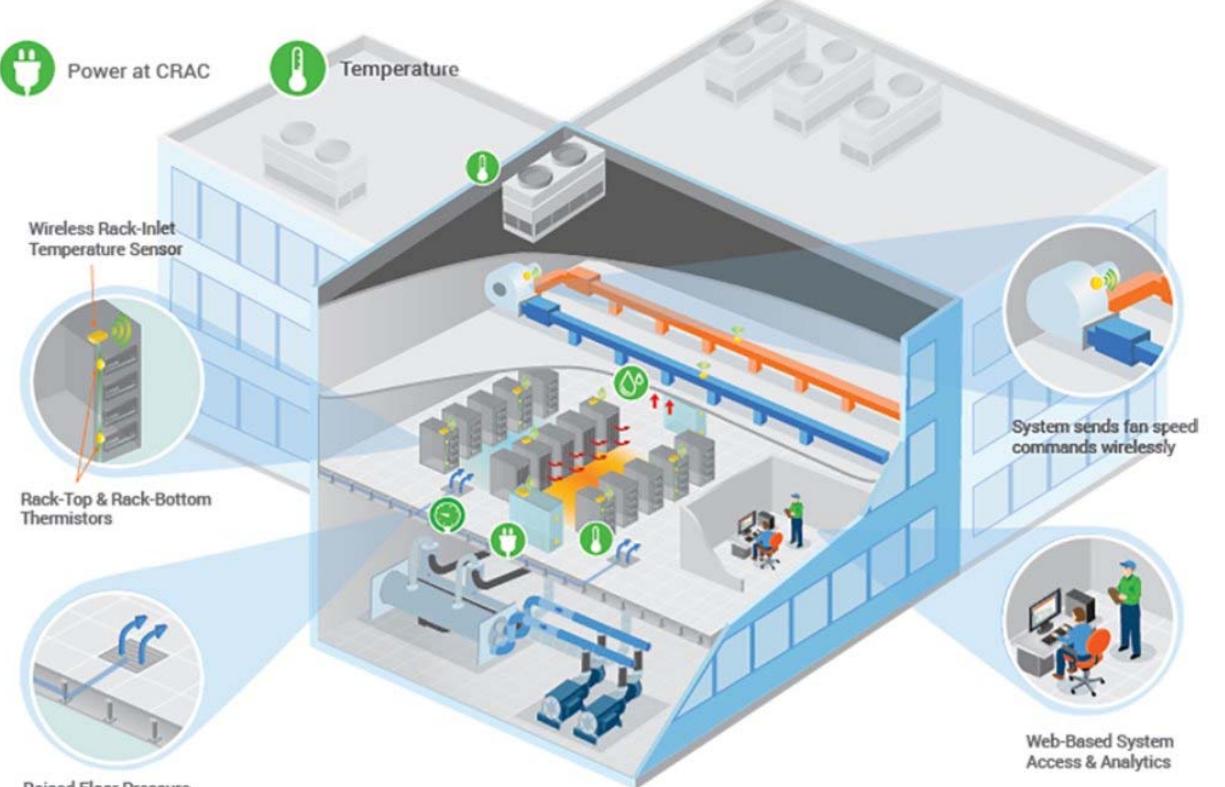


Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>https://www.vertiv.com/491dda/globalassets/products/thermal-management/room-cooling/liebert-cw-brochure.pdf.</p> <p>Computer Room Air Conditioning unit. A standalone device sitting on the data center floor that provides cool air to the room via a fan. CRAC units usually have multiple local compressors and self-contained refrigerant as the cooling agent.</p> <p>CRAH</p> <p>Computer Room Air Handler unit. A standalone device sitting on the data center floor that provides cool air to the room via a fan. CRAH units typically use chilled water as the cooling agent that is supplied from a central chilled water plant in the facility.</p> <p>CT</p> <p>The Current Transducer (CT) is used with a power sensor to measure power of cooling units.</p> <p>CW</p> <p>Chilled Water unit. A type of CRAC unit that uses chilled water from a dedicated, onsite chiller plant to cool the discharge air.</p> <p>Digital Realty also, or alternatively, uses Vigilent's dynamic cooling management which supplies chilled water to the Computer Room Air Handler unit, CRAH (heat exchanger units) from a central chilled water plant.</p> <p>https://fccid.io/ANATEL/01612-15-08292/MANUAL/16006226-67DD-49FB-8873-2E15C3330211/PDF, Page 153.</p>

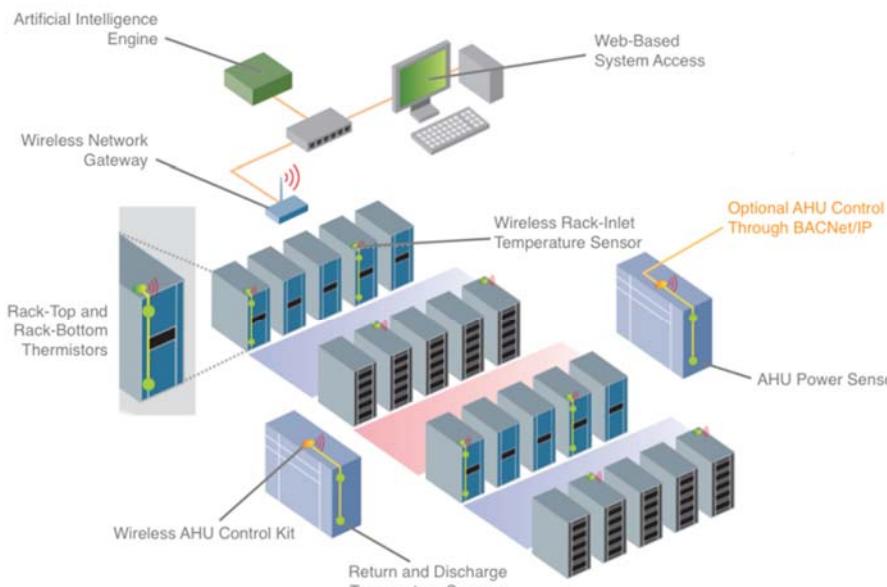
Claim 1	Exemplary Evidence of Infringement by Digital Realty
	 <p>The diagram illustrates a data center cooling system with the following components and monitoring points:</p> <ul style="list-style-type: none"> Power at CRAC: Monitored by a green plug icon. Temperature: Monitored by a green thermometer icon. Wireless Rack-Inlet Temperature Sensor: Monitored by a green icon with a signal. Rack-Top & Rack-Bottom Thermistors: Monitored by a green icon with a signal. Raised Floor Pressure: Monitored by a green icon with a signal. System sends fan speed commands wirelessly: Monitored by a green icon with a signal. Web-Based System Access & Analytics: Monitored by a green icon with a signal. <p>The data center interior shows server racks, Liebert cooling units, and a network of pipes and ducts. A person is shown working at a desk, indicating a web-based system for access and analytics.</p> <p>https://www.vigilent.com/products-and-services/monitoring/.</p>
<p>[1c] cooling said received air through heat exchange with the cooling fluid in the plurality of heat exchanger units;</p>	<p>Digital Realty cools said received air through heat exchange with the cooling fluid in the plurality of heat exchanger units.</p> <p>For example, Digital Realty uses Liebert cooling units to cool fluid (refrigerant) through the coil. The cooling fluid through the coil is chilled water/glycol. Liebert cooling units receive the “return air” from the room and deliver cool conditioned “supply air” to the room, by transferring heat from the air to the cooling fluid within the coil.</p>

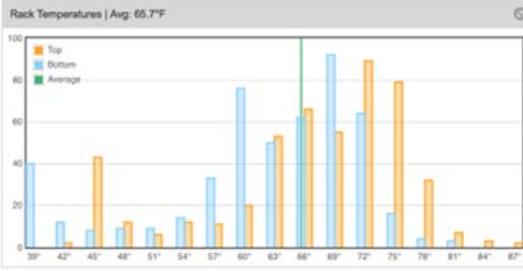
Claim 1	Exemplary Evidence of Infringement by Digital Realty
	 <p>https://www.vertiv.com/4afe7d/globalassets/products/thermal-management/room-cooling/liebert-dse-80-165kw-23-43-tons-downflow-system-design-manual.pdf, pp. 3, 6.</p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>Digital Realty also, or alternatively, uses Vigilent's dynamic cooling management which supplies</p> <p>Computer Room Air Conditioning unit. A standalone device sitting on the data center floor that provides cool air to the room via a fan. CRAC units usually have multiple local compressors and self-contained refrigerant as the cooling agent.</p> <p>CRAH</p> <p>Computer Room Air Handler unit. A standalone device sitting on the data center floor that provides cool air to the room via a fan. CRAH units typically use chilled water as the cooling agent that is supplied from a central chilled water plant in the facility.</p> <p>CT</p> <p>The Current Transducer (CT) is used with a power sensor to measure power of cooling units.</p> <p>CW</p> <p>Chilled Water unit. A type of CRAC unit that uses chilled water from a dedicated, onsite chiller plant to cool the discharge air.</p> <p>chilled water to the Computer Room Air Handler unit, CRAH (heat exchanger units) from a central chilled water plant.</p> <p>https://fccid.io/ANATEL/01612-15-08292/MANUAL/16006226-67DD-49FB-8873-2E15C3330211/PDF, Page 153.</p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	 <p>https://www.vigilent.com/products-and-services/monitoring/.</p>
[1d] sensing temperatures at one or more locations in said room;	<p>Digital Realty senses temperatures at one or more locations in said room.</p> <p>For example, Digital Realty uses Liebert cooling units and the Liebert cooling unit control system senses temperatures at the supply sensor, remote sensor, or return sensor locations.</p>

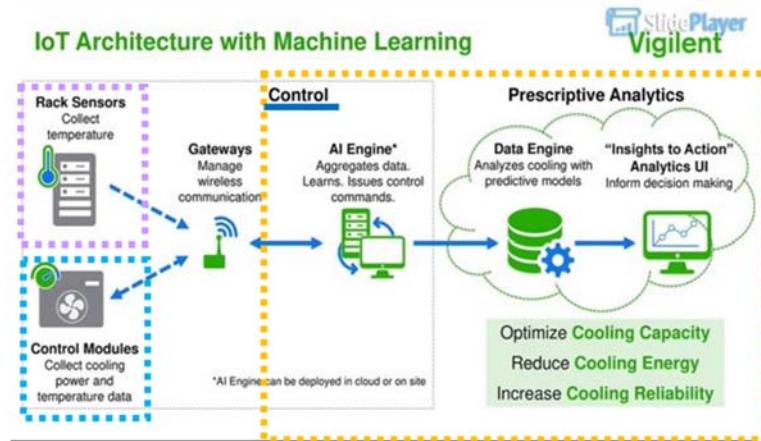
Claim 1	Exemplary Evidence of Infringement by Digital Realty																							
	<p>3.1.12 Automatic Fan Speed Control</p> <p>Temperature sensors can control fan speed using one of three modes based on the type of sensor selected as the fan-control sensor: supply, return, or remote, see Table 3.2 below. Control is based on the selected sensor for both fan control and temperature control and their setpoints as follows:</p> <ul style="list-style-type: none"> • Coupled: The fan control and temperature control sensor selection is the same. When coupled, fan speed is determined by the temperature setpoints. • Decoupled: The fan control and temperature control sensor selection is different. When decoupled, fan speed is determined by the fan setpoints. <p>Table 3.2 Fan Speed Controlling Sensor Options</p> <table border="1"> <thead> <tr> <th colspan="2"></th> <th colspan="3">Temperature Control Sensor Selected</th> </tr> <tr> <th colspan="2"></th> <th>Supply Sensor</th> <th>Remote Sensor</th> <th>Return Sensor</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Fan Control Sensor Selected</td> <td>Supply Sensor</td> <td>Coupled</td> <td>N/A</td> <td>N/A</td> </tr> <tr> <td>Remote Sensor</td> <td>Decoupled (Recommended)</td> <td>Coupled</td> <td>N/A</td> </tr> <tr> <td>Return Sensor</td> <td>Decoupled</td> <td>Decoupled</td> <td>Coupled</td> </tr> </tbody> </table> <p>https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 45.</p> <p>Digital Realty also, or alternatively, uses Vigilent's dynamic cooling management which reads rack sensors (deployed on the plurality of server racks) configured to measure inlet and outlet temperatures across the data center.</p>			Temperature Control Sensor Selected					Supply Sensor	Remote Sensor	Return Sensor	Fan Control Sensor Selected	Supply Sensor	Coupled	N/A	N/A	Remote Sensor	Decoupled (Recommended)	Coupled	N/A	Return Sensor	Decoupled	Decoupled	Coupled
		Temperature Control Sensor Selected																						
		Supply Sensor	Remote Sensor	Return Sensor																				
Fan Control Sensor Selected	Supply Sensor	Coupled	N/A	N/A																				
	Remote Sensor	Decoupled (Recommended)	Coupled	N/A																				
	Return Sensor	Decoupled	Decoupled	Coupled																				

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>Wireless Rack-Inlet Temperature Sensor – Wireless sensor that measures temperature at the top and bottom of the rack inlet.</p> <p>Rack-Top and Rack-Bottom thermistors – Attached via a cable sleeve, these are the physical monitoring points for each temperature sensor.</p> <p>https://fccid.io/ANATEL/01612-15-08292/MANUAL/16006226-67DD-49FB-8873-2E15C330211/PDF, p. 2.</p>  <p>https://fccid.io/ANATEL/01612-15-08292/MANUAL/16006226-67DD-49FB-8873-2E15C330211/PDF, p. 1.</p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>  </p> <p> https://fccid.io/ANATEL/01612-15-08292/MANUAL/16006226-67DD-49FB-8873-2E15C3330211/PDF, p. 4. </p> <p>Wireless Sensors</p> <p>Wireless sensors are typically deployed every third rack to measure the inlet air temperature every minute. The sensors have two thermistors, one to capture temperature at rack bottom, the other at rack top.</p> <p>Wireless sensors are also used to monitor return and supply air temperature, and the power consumed, by each cooling unit. Sensors are also available to measure other environmental conditions, namely pressure and humidity.</p> <p>The sensors are based on advanced mesh networking technology, which allows each node to be both a source and repeater for other nodes, allowing the network to automatically self-configure and be resilient to intermittent outages or changes in site layout.</p> <p> https://www.vigilent.com/technology/system-architecture/ </p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty																							
<p>[1e] controlling at least one of the temperature of said cooling fluid and said air delivery by said plurality of heat exchanger units to said room in response to said sensed temperatures at said one or more locations; and</p>	<p>Digital Realty controls at least one of the temperature of said cooling fluid and said air delivery by said plurality of heat exchanger units to said room in response to said sensed temperatures at said one or more locations.</p> <p>For example, Digital Realty uses Liebert cooling units which have temperate sensors that control fan speed in response to sensed temperatures.</p> <p>3.1.12 Automatic Fan Speed Control</p> <p>Temperature sensors can control fan speed using one of three modes based on the type of sensor selected as the fan-control sensor: supply, return, or remote, see <u>Table 3.2</u> below. Control is based on the selected sensor for both fan control and temperature control and their setpoints as follows:</p> <ul style="list-style-type: none"> • Coupled: The fan control and temperature control sensor selection is the same. When coupled, fan speed is determined by the temperature setpoints. • Decoupled: The fan control and temperature control sensor selection is different. When decoupled, fan speed is determined by the fan setpoints. <p>Table 3.2 Fan Speed Controlling Sensor Options</p> <table border="1"> <thead> <tr> <th colspan="2"></th> <th colspan="3">Temperature Control Sensor Selected</th> </tr> <tr> <th colspan="2"></th> <th>Supply Sensor</th> <th>Remote Sensor</th> <th>Return Sensor</th> </tr> <tr> <th rowspan="3">Fan Control Sensor Selected</th> <th>Supply Sensor</th> <td>Coupled</td> <td>N/A</td> <td>N/A</td> </tr> </thead> <tbody> <tr> <th>Remote Sensor</th> <td>Decoupled (Recommended)</td> <td>Coupled</td> <td>N/A</td> </tr> <tr> <th>Return Sensor</th> <td>Decoupled</td> <td>Decoupled</td> <td>Coupled</td> </tr> </tbody> </table> <p>https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 45.</p> <p>The Liebert cooling unit controls activates the flow of chilled water/glycol, and varies cooling capacity by adjusting a motorized ball valve.</p>			Temperature Control Sensor Selected					Supply Sensor	Remote Sensor	Return Sensor	Fan Control Sensor Selected	Supply Sensor	Coupled	N/A	N/A	Remote Sensor	Decoupled (Recommended)	Coupled	N/A	Return Sensor	Decoupled	Decoupled	Coupled
		Temperature Control Sensor Selected																						
		Supply Sensor	Remote Sensor	Return Sensor																				
Fan Control Sensor Selected	Supply Sensor	Coupled	N/A	N/A																				
	Remote Sensor	Decoupled (Recommended)	Coupled	N/A																				
	Return Sensor	Decoupled	Decoupled	Coupled																				

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	<p>7.1.4 Temperature Control with a Fluid Economizer</p> <p>When an economizer is installed, the cooling requirement (determined by the temperature proportional band) is addressed first by the economizer's secondary cooling. If the economizer cooling capacity is insufficient, the compressor(s) begin cooling to bring the room air temperature down to the temperature setpoint.</p> <p>The fluid economizer employs a motorized ball valve that controls the flow of chilled water/glycol to provide a cooling capacity from 0% to 100%.</p> <p>https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 110.</p> <p>RWT Return water temperature. Measured temperature of the chilled water loop returning to the chiller.</p> <p>S SAT Supply Air Temperature. Measured temperature of the air leaving an AHU that is being supplied to the building zones.</p> <p>Digital Realty also, or alternatively, uses Vigilent's dynamic cooling management to generate an airflow for an optimal cooling output using the CRAH unit based on the temperature of the rack sensors.</p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>Computer Room Air Conditioning unit. A standalone device sitting on the data center floor that provides cool air to the room via a fan. CRAC units usually have multiple local compressors and self-contained refrigerant as the cooling agent.</p> <p>CRAH</p> <p>Computer Room Air Handler unit. A standalone device sitting on the data center floor that provides cool air to the room via a fan. CRAH units typically use chilled water as the cooling agent that is supplied from a central chilled water plant in the facility.</p> <p>https://fccid.io/ANATEL/01612-15-08292/MANUAL/16006226-67DD-49FB-8873-2E15C330211/PDF, pp. 157, 158</p> <div>  <p>IoT Architecture with Machine Learning</p> <p>Control</p> <ul style="list-style-type: none"> Rack Sensors: Collect temperature Control Modules: Collect cooling power and temperature data Gateways: Manage wireless communication AI Engine*: Aggregates data. Learns. Issues control commands. <p>Prescriptive Analytics</p> <ul style="list-style-type: none"> Data Engine: Analyzes cooling with predictive models Analytics UI: "Insights to Action" Analytics UI Inform decision making <p>Optimize Cooling Capacity Reduce Cooling Energy Increase Cooling Reliability</p> <p><small>*AI Engine can be deployed in cloud or on site</small></p> </div> <p>https://slideplayer.com/slide/12118919/</p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>Using wireless temperature sensors, the system collects granular information about the thermal environment of your facility. Temperature sensors are placed every three to four racks measuring temperature at the top and bottom of the rack. Thermal data is communicated via a wireless mesh network back to the control software.</p> <p>The AI control software uses the real-time thermal data to learn and build an airflow model of the environment. The model is used to determine the optimal cooling output to ensure that the thermal environment is maintained with a minimal amount of energy.</p> <p>The software then makes active control decisions for each cooling unit. The Data Center Control section provides more detail on the different control capabilities of the system. The real-time temperature monitoring provides thermal feedback as the software begins to control the environment. This constant monitoring and control response occurs automatically and dynamically to optimize your thermal environment.</p> <p>https://fccid.io/ANATEL/01612-15-08292/MANUAL/16006226-67DD-49FB-8873-2E15C3330211/PDF, pp. 102, 103.</p>
[1f] wherein the step of controlling said air delivery by said plurality of heat exchanger units comprises individually manipulating a mass flow rate of the cooling fluid supplied to each of the plurality of heat exchanger units.	<p>Digital Realty controls said air delivery by said plurality of heat exchanger units comprises individually manipulating a mass flow rate of the cooling fluid supplied to each of the plurality of heat exchanger units.</p> <p>For example, Digital Realty uses Liebert cooling units which have Teamwork mode. Teamwork mode evaluates changes in the air temperature of the inlet, outlet, or supply temperature of the heat dissipating devices and adjusts one or more cooling units controls to provide the required cooling capacity.</p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>6 Teamwork, Standby and Rotation for Cooling Units</p> <p>U2U communication via private network and additional hardware (see U2U Networking on page 95) allows the following operating features for the cooling units:</p> <ul style="list-style-type: none">• Teamwork• Standby (Rotation)• Cascade <p>https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 99.</p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>6.2.3 Teamwork Mode 1—Parallel Operation</p> <p>In Teamwork mode 1, fan speed and cooling capacity are ramped up in parallel, which means that all units operate identically. Teamwork mode 1 is best for small rooms with balanced heat loads. A master unit collects the controlling readings for temperature and humidity from all the operating (fan on) units in the group, then determines the average or worst-case reading, and sends operating instructions to efficiently distribute cooling capacity across available units.</p> <p>In Teamwork mode 1, most parameters are shared and, when set in any unit, are set in all units in the group.</p> <p>6.2.4 Teamwork Mode 2—Independent Operation</p> <p>Teamwork mode 2 works well for most applications, and best in large rooms with un-balanced heat loads by preventing units in a group from operating in opposing modes, some cooling and some heating. All temperature and humidity parameters are shared by the group. The master unit monitors all available unit-sensor readings and determines the demand for cooling, heating, humidification and dehumidification, then sends operating instructions to address the greatest demand.</p> <p>In Teamwork mode 2, the setpoints for all units must be identical. The proportional band, deadband, and related settings may differ by unit. Fan speed is modulated per unit. Rotation and cascading is not available, so expect uneven distribution of work hours.</p> <p>6.2.5 Teamwork Mode 3—Optimized Aisle Operation</p> <p>In Teamwork Mode 3, the fan speed for all units operates in parallel, which means fan speed operation is identical at each unit. However, cooling capacity operates independently for each unit.</p> <p>Teamwork mode 3 takes advantage of variable speed fan options and variable capacity component options to maintain rooms with an unbalanced load and to prevent units in a group from operating in opposing modes. All units operate in the same mode based on the average or worst case (maximum) readings from the unit sensors. A local control (cooling capacity supply sensor) provides input to manage and maintain the discharge-air temperature at each unit. In addition, fan speed and operation are controlled based on readings from the unit temperature or static pressure sensors to control air delivery to the cold aisle.</p> <p>https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 102.</p>

Claim 1	Exemplary Evidence of Infringement by Digital Realty
	<p>The Liebert cooling units also have standby mode. Standby mode evaluates changes in the air temperature of the inlet, outlet, or supply temperature of the heat dissipating devices and actives/de-actives one or more cooling units to provide the required cooling capacity.</p> <p>6.3 Assigning Cooling Units to Standby (Lead/Lag)</p> <p>Standby assigns some units to operate while others are on standby, meaning a unit is idle but ready to become active in the event of an alarm condition in one of the operating units or based on a rotation schedule.</p> <p>When a unit is in standby mode, fan(s) are off and no cooling occurs. In multiple cooling unit systems, assigning units to standby lets you:</p> <ul style="list-style-type: none"> Configure redundancy in case of failure scenarios (standby). Manage cooling unit run time (lead/lag). See Setting a Rotation Schedule on the next page . Modulate for very low loads to full design load (to be temperature reactive) by cascading activation of standby units (configured when setting up teamwork mode). <hr/> <p>https://www.vertiv.com/49b8b2/globalassets/shared/liebert-icom-user-manual_sl-31075.pdf, p. 103.</p> <p>Digital Realty also, or alternatively, uses Vigilent's dynamic cooling management to control the water flow supplied to each cooling unit automatically based on the measured temperature.</p> <p>CRAH Computer Room Air Handler unit. A standalone device sitting on the data center floor that provides cool air to the room via a fan. CRAH units typically use chilled water as the cooling agent that is supplied from a central chilled water plant in the facility.</p> <p>WtrFlow Measured volumetric water flow rate.</p>

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	<p>https://fccid.io/ANATEL/01612-15-08292/MANUAL/16006226-67DD-49FB-8873-2E15C3330211/PDF, p. 153.</p> <p>Using wireless temperature sensors, the system collects granular information about the thermal environment of your facility. Temperature sensors are placed every three to four racks measuring temperature at the top and bottom of the rack. Thermal data is communicated via a wireless mesh network back to the control software.</p> <p>The AI control software uses the real-time thermal data to learn and build an airflow model of the environment. The model is used to determine the optimal cooling output to ensure that the thermal environment is maintained with a minimal amount of energy.</p> <p>The software then makes active control decisions for each cooling unit. The Data Center Control section provides more detail on the different control capabilities of the system. The real-time temperature monitoring provides thermal feedback</p> <p>The thermal data is communicated via a wireless mesh network back to the control software. The AI control software uses the real-time thermal data to learn and build an airflow model of the environment. The model is used to determine the optimal cooling output to ensure that the thermal environment is maintained with a minimal amount of energy.</p> <p>The software then makes active control decisions for each cooling unit. The Data Center Control section provides more detail on the different control capabilities of the system. The real-time temperature monitoring provides thermal feedback</p> <p>https://fccid.io/ANATEL/01612-15-08292/MANUAL/16006226-67DD-49FB-8873-2E15C3330211/PDF, pp. 102, 103.</p> <p>How does the software control each cooling unit?</p> <p>There are many differences in how a cooling unit can be controlled. Some units can only be turned ON and OFF. Some have Variable Frequency Drives (VFDs) for fan speed control, and others have been retrofitted with EC Plug Fans, which also have fan speed control. The Vigilant System is designed to work with all of these units and even a mix of different types.</p> <p>The Vigilant system controls the HVAC equipment to keep each zone temperature within its set point, configured by the user in the Set Points tab, while reducing airflow energy. The reduced airflow conserves energy by reducing fan power and putting less demand on chiller plants and boilers.</p> <p>https://fccid.io/ANATEL/01612-15-08292/MANUAL/16006226-67DD-49FB-8873-2E15C3330211/PDF, pp. 104, 107.</p>

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	<p>Set Overrides Enter the override values for the listed controls. Note: A blank value (or AUTO for On/Off controls) will remove the override.</p> <p>On/Off: AUTO ▾</p> <p>Save</p> <p>Cancel</p> <p>ON</p> <p>OFF</p> <p>AUTO</p> <ul style="list-style-type: none">● AUTO means the Vigilant system is in control of this unit and will turn the unit on or off automatically as necessary.● ON will turn the unit on, and disables the ability of the Vigilant system to control this unit. It will remain on until this override is removed.● OFF will turn the unit off, and disables the ability of the Vigilant system to control this unit. It will remain off until this override is removed. <p>https://fccid.io/ANATEL/01612-15-08292/MANUAL/16006226-67DD-49FB-8873-2E15C330211/PDF, p. 47.</p>